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Aiding of cognitive function

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AIDING OF COGNITIVE FUNCTION**FIELD OF THE INVENTION**

The present invention relates to the use of certain micro-
5 nutrients in the preparation of an edible composition for
aiding the cognitive development or performance of humans
having an age of up to 18 years. It also relates to a method of
aiding the cognitive development or performance of such humans
by using the aforementioned edible composition.

10

BACKGROUND OF THE INVENTION

In recent years there has been an increasing interest in the
link between nutrition and cognitive performance in humans,
15 especially, in the impact of nutrition on the development of
cognitive abilities during childhood.

Iron is thought to be an important nutrient for the cognitive
performance and development of children because the areas of
20 the brain that are sensitive to iron deficiency (such as the
cortex, frontal lobes and hippocampus) are the areas
responsible for higher level cognitive functions such as
executive functions and memory (Beard, 1995, American Journal
of Nutrition, 62, 709-710).

25

Zinc may have independent effects on cognitive performance, as
well as an indirect effect through the enhancement of the
efficacy of iron (Black & Miguel, 2001, The emerging roles of
zinc in human nutrition, development and infectious disease,
30 part 1, Nutrition Today, 36, 281-290). Zinc is important for
cognitive performance and development of children because it is
important for myelination and release of the neurotransmitters

GABA and glutamate that are key modulators of neuronal excitability (Bhatnagar & Taneja, 2001, Zinc & cognitive development. British Journal of Nutrition, 85, S139-S145).

Intervention studies show that 20mg/day zinc plus other
 5 micronutrients has a positive effect on reasoning and visual recognition in Chinese and Mexican American school-aged children (Penland, 2000, Behavioural data and methodological issues in studies of zinc nutrition in humans, Journal of Nutrition, 130, 361S-364S).

10

Vitamin B-6 may affect the glutaminergic system and N-methyl-D-aspartate (NMDA) receptor that is important for learning and memory (Calvaresi & Bryan, 2001, B vitamins, cognition and ageing: A review. Journal of Gerontology: Psychological

15 Sciences, 56, P327-P339). Correlational studies in children in India (Refsum et al., 2001 - Hyperhomocysteinemia and elevated methylmalonic acid indicate a high prevalence of cobalamin deficiency in Asian Indians. American Journal of Clinical Nutrition, 74, 233-241) and Indonesia (Setiawan, et al., 2000

20 Vitamin B-6 inadequacy is prevalent in rural, and urban Indonesian children. Journal of Nutrition, 130, 553-558) have shown associations between B-12 and B-6 deficiency and poorer cognitive performance.

25 Certain omega-3 Polyunsaturated Fatty Acids (PUFAs) have been linked with cognitive performance. Studies have shown that infants who are fed formula milk supplemented with docosahexaenoic acid (DHA), α -linolenic acid (ALA) and arachidonic acid (AA), and those who are breast-fed demonstrate
 30 better visual acuity and cognitive performance, including problem solving (Uauy et al, 2001, Essential fatty acids in somatic growth and brain development. Nutrition and fitness:

Diet, genes, physical activity and health. NY: Karger. pp.134-160).

There is an increasing demand in the art for edible compositions
5 that will aid the cognitive development or performance of humans,
especially those having an age of up to 18 years. Preferably,
such edible compositions can be added to ordinary foodstuffs, or,
they can be consumed separately.

10 The present invention seeks to provide edible compositions that
aid the cognitive development or performance of humans,
especially those having an age of up to 18 years.

In particular, it is an object of the invention to provide
15 compositions that aid the cognitive development or performance of
humans, especially those having an age of up to 18 years and that
can be added to ordinary foodstuffs, or, can be consumed
separately.

20 SUMMARY OF THE INVENTION

Surprisingly, it has now been found that edible compositions that
comprise a mixture of one or more bioavailable metal compounds or
polyunsaturated fatty acids and at least one B vitamin aid the
25 cognitive development or performance of humans, especially those
having an age of up to 18 years. These edible compositions can
be added to ordinary foodstuffs, or, can be consumed separately.

According to a first aspect, the present invention provides the
30 use of:

- 1) at least one of a bioavailable iron compound, a bioavailable
zinc compound and a polyunsaturated fatty acid, and
- 2) at least one B vitamin,

in an edible composition, wherein the edible composition after consumption aids the cognitive development or performance of humans having an age of up to 18 years.

- 5 According to a second aspect, the present invention provides method for aiding the cognitive development or performance of humans having an age of up to 18 years, the method comprising the step of administering to said human by means of an edible composition;
- 10 1) at least one of a bioavailable iron compound, a bioavailable zinc compound and a polyunsaturated fatty acid, and
2) at least one B vitamin.

It is preferred according to both the second and first aspect
15 of the invention that the edible composition after consumption aids the cognitive development or performance of humans having an age of from 6 to 9 years.

The terms "cognition" and "cognitive function" as used herein
20 are interchangeable and refer to a construct of a range of functions:

- Intelligence (fluid, crystallised),
- Creativity (generate and open to new ideas, perceive new relationships),
- 25 — Memory (encoding, storage, retrieval),
- Executive functions (dealing with novelty, planning & implementation, monitoring performance, vigilance, inhibition of task irrelevant info),
- Cognitive resources (speed of information processing, working
30 memory capacity, attentional capacity).

The term "cognitive development" as used herein refers to

the development of cognition (cognitive function) over time.

The quality of cognition (cognitive function) in a human can be assessed by tests measuring cognitive performance. As cognition (cognitive function) of a growing child develops over time with
5 brain development, measuring the cognitive performance over time for a given child, provides a measure of cognitive development. For example, for children aged 6-9 years, cognitive development is generally recognised by :

- 10 — A spurt in information processing capacity and/or executive functions.
 - Development of the frontal lobes of the brain (involved in executive functions). These growth spurts may also occur at other periods during childhood (e.g. 0-2 and mid-teens).
- 15 The present invention provides a convenient and effective way of aiding the cognitive development or performance of humans having an age of up to 18 years.

Except in the operating and comparative examples, or where
20 otherwise explicitly indicated, all numbers in this description indicating amounts of material or conditions of reaction, physical properties of materials and/or use are to be understood as modified by the word "about". All amounts are as percentages by weight unless otherwise stated. For the edible
25 compositions, all percentages are by weight based on the total weight of the composition unless otherwise stated.

The term "comprising" is meant not to be limiting to any subsequently stated elements but rather to encompass non-
30 specified elements of major or minor functional importance. In other words the listed steps, elements or options need not be exhaustive. Whenever the words "including" or "having" are

used, these terms are meant to be equivalent to "comprising" as defined above.

A serving of the edible composition as referred to herein
5 refers to the amount of the edible composition that is provided to be consumed as a single portion, typically in a single sitting. For beverages, the typical serving size is in the range of from 100 to 500 ml and for a bar product or cookie etc will be in the range of from 20 to 100 g. However, it will be
10 understood that the serving size will vary according to the type of edible composition.

DETAILED DESCRIPTION

15 According to the present invention, edible compositions that comprise a specific mixture of one or more bioavailable metal compounds or polyunsaturated fatty acids and at least one B vitamin can be used to aid the cognitive development or performance of humans having an age of up to 18 years. Further
20 details of the edible compositions and their components are given below.

Iron compound

The present invention may use a bioavailable iron compound,
25 that is, an iron compound that is at least partially bioavailable to the body. Any bioavailable iron compound may be used according to the present invention although ferrous iron is generally better utilized by the body than ferric iron.

30 Bioavailable iron compounds which can be used include edible inorganic iron compounds such as edible ferrous compounds, for example ferrous sulfate. Whilst ferrous iron is typically more bioavailable, certain ferric salts can also provide highly bioavailable compounds of iron and these may also be used

according to the present invention. Suitable examples include ferric sulfate and ferric chloride and mixtures thereof.

Edible bioavailable iron organic compounds may also be used according to the present invention. Preferred examples include ferrous carboxylate salts such as ferrous fumarate, ferrous succinate, ferrous tartarate, ferrous lactate, ferrous gluconate, ferrous citrate and mixtures thereof. Whilst, as stated above ferrous iron is typically more bioavailable, highly bioavailable edible ferric compounds that may be used in the present invention include ferric carboxylate salts such as ferric ammonium citrate, ferric citrate and mixtures thereof.

An especially preferred bioavailable iron organic compound is ferric EDTA (sodium ferric ethylenediaminetetraacetic acid or sodium iron ethylenediaminetetracetic acid, NaFeEDTA). Ferric EDTA has the advantage that it does not appreciably interchange with other cations often present in edible compositions with added vitamin/mineral mixes (e.g., sodium, calcium, potassium, zinc, iodine, vitamin C, vitamin E, and the like) and thus no significant free iron is generated. This aids in the colour and flavour stability of the food product. It is also relatively stable in edible compositions and has good bioavailability.

Other edible iron organic compounds which can be used according to the present invention include bioavailable iron-sugar-carboxylate complexes. These materials are referred to herein as "complexes," but they may, in fact, exist in solution as complicated, highly hydrated, protected colloids. However, the term "complex" is used for the purpose of simplicity. Such materials are described in US 6 509 045 which is incorporated by reference herein.

In these iron-sugar-carboxylate complexes, the carboxylate provides the counterion for the ferrous (preferred) or ferric iron. Sugars that can be used to produce these complexes include any of the edible saccharidic sugars such as glucose, sucrose and fructose, mannose, galactose, lactose, maltose, and the like, with sucrose and fructose being preferred. Mixtures thereof may also be used. The carboxylic acid used may be any edible carboxylic acid such as citric acid, malic acid, tartaric acid, lactic acid, succinic acid, propionic acid, and mixtures thereof. Particular examples include ferric saccharide, ferric saccharate and mixtures thereof.

US 6 509 045 also discloses that it is known that iron is more bioavailable if administered in the form of chelates wherein the chelating ligands are amino acids or protein hydrolysates (see U.S. 3,969,540 and U.S. 4,020,158). These chelated iron compounds are known in the art by various names such as iron proteinates, iron amino acid chelates and peptide or polypeptide chelates. Such materials may also be used according to the present invention.

Particularly suitable ferrous amino acid chelates are those where the reacting ligands are glycine, lysine, and leucine, including the ferrous amino acid chelate where the reacting ligand is glycine.

Ferrous amino acid chelates particularly suitable as highly bioavailable amino acid chelated irons for use in the present invention are those having a ligand to metal ratio of at least 2:1. For example, suitable ferrous amino acid chelates having a ligand to metal mole ratio of two are those of formula: $\text{Fe}(\text{L})_2$ where L is an alpha amino acid, dipeptide, tripeptide or

quadrapeptide reacting ligand. Thus, L can be any reacting ligand that is a naturally occurring alpha amino acid selected from alanine, arginine, asparagine, aspartic acid, cysteine, cystine, glutamine, glutamic acid, glycine, histidine, 5 hydroxyproline, isoleucine, leucine, lysine, methionine, omithine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine and valine or dipeptides, tripeptides or quadrapeptides formed by any combination of these alpha amino acids. See U.S. Pat. No. 3,969,540 and U.S. Pat. No. 4,020,158 10 which are incorporated by reference.

Elemental iron may also be used according to the present invention and is considered herein to be a bioavailable compound even though, strictly speaking, it is not a compound. 15

Mixtures of one or more of any of the above bioavailable iron compounds may also be used. It is preferred that the bioavailable iron compound is selected from ferrous inorganic compounds, ferrous carboxylate salts, iron-sugar-carboxylate 20 complexes, chelated iron compounds and mixtures thereof. The bioavailable iron compounds, where appropriate, may be in a hydrated form. An especially preferred bioavailable iron compound is sodium ferric ethylenediaminetetraacetic acid or sodium iron ethylenediaminetetracetic acid, known as NaFeEDTA.

25 The bioavailable iron compounds, may if desired, be in an encapsulated form.

The amount of bioavailable iron compound used in the edible 30 composition may be any amount which aids the cognitive development or performance of humans having an age of up to 18 years. It is preferred that an amount of up to 50mg of iron from the bioavailable iron compound is used in the edible

compositions, more preferably 0.5 to 30 mg, most preferably 1 to 20 mg, such as 2 to 15mg per serving of the edible composition. These amounts are based on the weight of the iron in the bioavailable iron compound and not on the total weight of the bioavailable iron compound. Thus the weight of the bioavailable iron compound will be correspondingly greater depending upon the compound used.

Zinc Compounds

10 The present invention may use a bioavailable zinc compound, that is, a zinc compound that is at least partially bioavailable to the body.

Bioavailable zinc compounds which can be used include edible inorganic zinc compounds such as zinc oxide, zinc sulfate, zinc chloride and mixtures thereof.

Edible bioavailable zinc organic compounds may also be used according to the present invention. Preferred examples include zinc carboxylate salts such as zinc acetate, zinc gluconate, zinc ascorbate, zinc citrate, zinc aspartate, zinc picolinate and mixtures thereof.

Amino acid chelated zinc compounds of the type referred to above for iron compounds may also be used.

Mixtures of one or more of any of the above bioavailable zinc compounds may also be used. Preferably the bioavailable zinc compound is selected from inorganic zinc salts, zinc carboxylate salts, chelated zinc compounds and mixtures thereof. The compounds, where appropriate, may be in a hydrated form.

The bioavailable zinc compounds, may if desired, be in an encapsulated form.

It is especially preferred according to the present invention
5 that a bioavailable iron compound and a bioavailable zinc compound are used in the edible composition. According to one embodiment of the invention, it is particularly preferred that iron compound comprises NaFeEDTA and the zinc compound comprises zinc sulphate.7H₂O.

10

The amount of bioavailable zinc compound used in the edible composition may be any amount which aids the cognitive development or performance of humans having an age of up to 18 years. It is preferred that an amount of up to 50 mg of zinc
15 from the bioavailable zinc compound is used in the edible compositions, more preferably 0.5 to 20 mg, most preferably 0.7 to 15 mg, such as 1 to 10 mg per serving of the food product. These amounts are based on the weight of the zinc in the bioavailable zinc compound and not on the total weight of the
20 bioavailable zinc compound. Thus the weight of the bioavailable zinc compound will be correspondingly greater depending upon the compound used.

It is especially preferred that the weight ratio of the
25 bioavailable iron compound to the bioavailable zinc compound is at least 2:1, more preferably in the range of from 1.5:1 to 5:1, most preferably 2:1 to 4:1.

Polyunsaturated fatty acid

30 The present invention may use a polyunsaturated fatty acid. Preferably, any oil comprising omega 3 fatty acids, especially docosahexaenoic acid (DHA, C20:5) and/or eicosapentaenoic acid

(EPA, C22:5) may be used. Preferred omega 3 fatty acids are the following C18:3, C18:4, C20:4, C20:5, C22:5 and C22:6.

Preferably the polyunsaturated fatty acid may be incorporated
5 by the inclusion in the edible composition of fish oil and/or
an oil derived from algae.

The polyunsaturated fatty acid preferably comprises DHA and/or
EPA in a weight ratio of at least 2:1, more preferably at least
10 3:1, such as at least 4:1.

The polyunsaturated fatty acid is preferably used in amounts of
up to 2g per serving of the edible composition, more preferably
50 mg to 1 g per serving, more preferably 100 to 500 mg per
15 serving.

It is especially preferred according to the present invention
that the polyunsaturated fatty acid is used with either a
bioavailable iron compound or a bioavailable zinc compound in
20 the edible composition. Most preferred is that a
polyunsaturated fatty acid, especially a mixture of DHA and EPA
is used with both a bioavailable iron compound and a
bioavailable zinc compound in the edible composition.

25 B vitamins

The present invention uses at least one B vitamin, preferably,
selected from vitamins B6, B11 and B12. It is especially
preferred that the edible compositions comprises any two of
vitamins B6, B11 and B12, even more preferably each of B6, B11
30 and B12.

The at least one B vitamin is preferably used in amounts of up to 5 mg in a serving of the edible composition, preferably 0.05 to 3 mg, more preferably 0.1 to 2mg.

- 5 It is preferred that Vitamin B6 and B11 are individually used in amounts of from 0.05 to 5 mg, more preferably from 0.075 to 3 mg, most preferably from 0.1 to 2 mg per serving of the edible composition.
- 10 It is preferred that Vitamin B12 is used in amounts of from 0.0001 to 1 mg, preferably from 0.001 to 0.5 mg, most preferably from 0.0015 to 0.2 mg per serving of the edible composition.
- 15 For all the B vitamins above, the amount of the ingredient referred to is to the amount of the active ingredient.

Vitamins A and C

It known that concurrent supplementation with vitamin C can

- 20 improve iron absorption by the body. Vitamin A may enhance iron mobilisation and vitamin A and beta carotene increase the absorption of non-heme iron (Mejia & Chew, 1988, Hematological effects of supplementing anaemic children with vitamin A alone and in combination with iron. American Journal of Clinical
- 25 Nutrition, 48, 1271-1276).

Vitamin A and/or C is preferably included in the edible composition, most preferably, when iron is also present.

- 30 Vitamin A is preferably used in amounts of from 0.5 to 50 mg, preferably 1 to 20 mg, such as 2 to 10 mg based on the retinol acetate equivalent amount. Vitamin C is preferably used in

amounts of from 1 to 100 mg, preferably 5 to 75 mg, such as 10 to 65 mg.

It is especially preferred according to the present invention
5 that the edible composition comprises in addition to the B vitamins recited herein a polyunsaturated fatty acid, a bioavailable iron compound, a bioavailable zinc compound and vitamins A and/or C, especially both vitamins A and C.

10 Types of edible composition

The edible composition may be in the form of a nutritional supplement (such as a tablet, powder, capsule or liquid product) or in the form of a food composition (product) including a beverage.

15

It is preferred that the edible composition is a food composition which further comprises at least one of protein, carbohydrate or fat. It is especially preferred that the food composition comprises at least protein and carbohydrate, most
20 especially in the amounts given above. Alternatively, a source of one of protein, carbohydrate and/or fat can be given at the same time as the edible composition, for example, if the edible composition does not contain substantial amounts of these ingredients. In this case, the edible composition of the
25 invention and an additional food product would provide a kit that could be used as according to the present invention. The comments herein to the protein, carbohydrate and fat content etc apply equally to the additional food product in such a kit.

30 The edible composition may be for example; a solid product, a powdered product, a liquid, a flowable, spoonable, pourable or spreadable product or a bar etc. The edible composition may be

a powder which is mixed with a liquid, such as water or milk, to produce a liquid or slurry product.

The edible compositions may be suitably selected from dairy based products (such as milk based products and drinks), soy based products including drinks, breads and cereal based products (including pasta or noodle based products and cereal bars), cakes, biscuits, ice creams, desserts, soups, porridge-type products, beverages including a ready-to-drink liquid, a liquid produced from a soluble powdered product, bar products, confectionery, snack foods, ready-to-eat meal products, pre-packed meal products, and dried meal products etc and soluble powdered products.

It is especially preferred that the edible compositions are in the form of a beverage (including dairy and soy based beverages), a bar product, a porridge, a biscuit or a cake.

Where an edible powder is provided according to the invention, this will be usually added to another food product, such as a beverage or a biscuit, to make consumption more convenient.

Protein

The edible composition further preferably comprises protein, this is preferred to provide energy to the consumer of the edible food product as well as the specific micronutrients described hereinabove. Any suitable protein may be used depending upon the type of edible composition.

Suitable sources of protein include dairy sources such as milk, yoghurt, kefir, cheese or cream. Other animal sources may also be used depending upon the type of edible composition.

Alternatively the edible composition may comprise vegetable

derived protein such as soy-protein, rice protein, pea protein or wheat protein.

The amount of protein in the edible composition is preferably an amount of from 0.1 to 30 or 40% by weight of the edible composition, preferably 0.5 to 25%wt, most preferably 1 to 20 %wt.

Carbohydrate

10 The edible compositions may also comprise one or more carbohydrates, preferably in an amount of from 1 to 90% by weight based on the weight of the composition, more preferably of from 5 to 80%wt, most preferably 10 to 75%wt. This is preferred to provide energy to the consumer of the edible food product as well as the specific micronutrients described
15 hereinabove.

Any suitable carbohydrate may be used, for example sucrose, lactose, glucose, fructose, corn syrup, maltodextrins, starch,
20 modified starch or mixtures thereof.

The edible composition may also comprise dietary fibres, for example in an amount of from 0.1 to 10% by weight based on the weight of the composition, preferably 0.5 to 5wt.

25 It is especially preferred that the edible composition comprises both protein and carbohydrate, preferably in the amounts given above.

30 Fat

The edible composition may comprise edible fats in addition to any polyunsaturated fatty acid referred to above. The compositions preferably comprise an amount of up to 40% by

weight based on the weight of the composition of other fats, more preferably from 0.5 to 30 or 35%wt, most preferably from 0.75 to 10 or 20% fat.

5 Any suitable fat may be used with vegetable fats being especially preferred. Suitable examples include vegetable fats, plant oils, nut oils, seed oils, or mixtures thereof. Saturated or unsaturated (mono-unsaturated and poly-unsaturated) fats may be used, although saturated fats are less
10 preferred.

The amounts of protein, fat, carbohydrate and other ingredients in the edible composition will vary according to the product format of the composition and also, where required, according
15 to national or regional legislation.

Optional ingredients

The edible composition may optionally comprise fruit or vegetable pieces or particles, concentrates, juice or puree,
20 preferably in amounts of up to 60% by weight of based on the weight of the edible composition. Preferably the compositions comprise 0.1 to 40%wt, more preferably 1 to 20%wt of these ingredients. The amount of these ingredients will depend upon the type of edible composition.

25

The edible composition may also comprise 0.1 to 15% by weight of edible salts based on the weight of the composition, preferably 3 to 8%wt. Any edible salts may be used, for example, sodium chloride, potassium chloride, alkali metal or
30 alkaline earth metal salts of citric acid, lactic acid, benzoic acid, ascorbic acid, or, mixtures thereof. Calcium salts may also be used such as calcium chloride and calcium caseinate.

The edible composition may further comprise ingredients selected from other added vitamins and/or minerals, herbs, spices, flavourings, stabilisers, emulsifiers, aromas, antioxidants, colourants, preservatives or mixtures thereof. These ingredients are used in conventional amounts.

These other added vitamins and/or minerals are preferably selected from at least one of vitamins A, B1, B2, B3, B5, biotin, D, E, H, K and calcium, magnesium, potassium, iodine, manganese, molybdenum, phosphorus, selenium and/or chromium.

Preparation

The edible compositions of the invention may be prepared by any suitable method of preparation, including mixing, blending, homogenising, high-pressure homogenising, emulsifying, dispersing, and/or encapsulating depending upon the type of edible composition. It is well within the skill of the person skilled in the art to select the most appropriate preparation method for different types of edible compositions.

Method of aiding the cognitive development or performance

The invention also provides the aforementioned method for aiding the cognitive development or performance of humans having an age of up to 18 years according to the second aspect of the invention.

The total effective administered to a subject according to the invention may vary according to the needs of the person to whom it is administered, e.g. age, general nutrition status etc. Typical amounts administered by the administration of the edible composition for each of the micronutrients according to the invention are listed above under the heading referring to

that micronutrient. These are the typical amounts administered per day per micronutrient. An effective daily amount may be administered by a single dose or by multiple doses.

- 5 The consumption of the edible composition of the invention preferably occurs as a part of the daily diet. It is preferred that the edible composition is consumed daily.

The invention is further described by way of the following

- 10 examples that are to be understood as not limiting. Further examples within the scope of the invention will be apparent to the person skilled in the art.

EXAMPLES

15

Example 1 - beverage

- 5 g of a powder having the composition shown in table 1 was added to 100 ml of a commercially available aqueous soy-based drink (ADES soy based fruit drink) comprising 0.6% wt of soy protein. The resulting beverage was mixed until the powder had dissolved.

Table 1 - composition of the powder

Ingredient	Amount of compound.	Amount of active ingredient.
FeNaEDTA	84 mg	10 mg iron.
ZnSO ₄ .7H ₂ O	23.1 mg	5 mg zinc
Fish oil powder *1	763 mg	88 mg DHA and 22 mg EPA
Vitamin B6 (pyridoxine.HCl)	1.34 mg	1 mg
Vitamin B11 (folic acid)	0.17 mg	0.15 mg

Vitamin B12 (cyanocobalamin, 0.1 % WS)	1.65 mg	0.0015 mg
Vitamin A (retinol acetate dry, 325.000 IU/g)	4.51 mg	0.4 mg (as retinol equivalent)
Vitamin C (Ascorbic acid)	54 mg	54 mg
Maltodextrin	2640 mg	2640 mg
Lecithin	300 mg	300 mg
Citric acid	40 mg	40 mg
Powdered sugar	1067 mg	1067 mg
Flavours	20 mg	20 mg

*1 - the fish oil powder contained 20% wt in total of DHA/EPA in a weight ratio of 4.5:1.

The edible composition can be consumed by humans aged up to 18 5 years of age to aids cognitive development or performance.

Claims

(99)

1. The use of:
 - 1) at least one of a bioavailable iron compound, a bioavailable zinc compound and a polyunsaturated fatty acid, and
 - 2) at least one B vitamin,in an edible composition, wherein the edible composition after consumption aids the cognitive development or performance of humans having an age of up to 18 years.
2. The use according to claim 1, wherein the edible composition comprises 0.5 to 30 mg per serving of the edible composition of iron from the bioavailable iron compound.
3. The use according to either one of claim 1 or 2, wherein the bioavailable iron compound is selected from ferrous inorganic compounds, ferrous carboxylate salts, iron-sugar-carboxylate complexes, chelated iron compounds and mixtures thereof.
4. The use according to any one of the preceding claims, wherein the edible composition comprises 0.5 to 20 mg per serving of the edible composition of zinc from the bioavailable zinc compound.
5. The use according to any one of the preceding claims, wherein the bioavailable zinc compound is selected from inorganic zinc salts, zinc carboxylate salts, chelated zinc compounds and mixtures thereof.

6. The use according to any one of the preceding claims, wherein the wherein the weight ratio of the bioavailable iron compound to the bioavailable zinc compound is at least 1:1.
7. The use according to any one of the preceding claims, wherein the edible composition comprises up to 2 g per serving of the at least one polyunsaturated fatty acid.
8. The use according to any one of the preceding claims, wherein the polyunsaturated fatty acid comprises docosahexaenoic acid and eicosapentaenoic acid in a weight ratio of at least 2:1.
9. The use according to any one of the preceding claims, wherein the at least one B vitamin is selected from vitamins B6, B11 and B12.
10. The use according to any one of the preceding claims, wherein the edible composition further comprises vitamin A and/or vitamin C.
11. The use according to any one of the preceding claims, wherein the edible composition further comprises protein and/or carbohydrate.
12. A method for aiding the cognitive development or performance of humans having an age of up to 18 years, the method comprising the step of administering to said human by means of an edible composition;

- 1) at least one of a bioavailable iron compound, a bioavailable zinc compound and a polyunsaturated fatty acid, and
- 2) at least one B vitamin.

21. 07. 2003

**Abstract**

The invention provides the use of at least one of a bioavailable iron compound, a bioavailable zinc compound and a polyunsaturated fatty acid, and at least one B vitamin, in an edible composition, wherein the edible composition after consumption aids the cognitive development or performance of humans having an age of up to 18 years.